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An Empirical Study of Applying ISO 9001 Elements in Large Size Indonesian Contractors

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Abstract
The effective implementation of such an ISO 9001 Quality Management System (QMS) in construction companies requires a proper and full implementation of the system to allow companies to improve the way they operate, by this means increasing profitability and market share, producing innovative and sustainable construction products, or improving employee and customer satisfaction. In light of this, this paper discusses the current status of QMS implementation, particularly related to the twenty elements of ISO 9001 within the grade 7 (G-7) category of Indonesian construction companies. A survey was conducted involving 403 respondents from 77 companies, to solicit an evaluation of the current implementation levels of the ISO 9001 elements. The survey findings indicated that for a large percentage of the sector surveyed they had 'not so fully implemented' the elements. Scrutiny of the data had also indicated elements that are 'minimally implemented', whilst none of the elements fell in the category of 'fully implemented'. Based on these findings, it is suggested that the G-7 contractors may need to fully commit to practicing control of customer-supplied product and statistical techniques in order to enhance an effective implementation of ISO 9001 elements for ensuring better quality performance. These two elements are recognized as the least implemented of the quality elements.

Keywords
ISO 9001 elements, Construction companies, Indonesia

1. Introduction

The influx of quality management systems in construction projects has been seen to significantly improve the quality of construction products and satisfaction levels of project owners. The system is perceived as a critical component to the successful management of construction projects (Ahmed *et al.*, 2005; Elghamrawy and Shibayama, 2008; Cachadinha, 2009). At this juncture, one of the quality management systems that is adopted worldwide by construction companies is an ISO 9001-compliant Quality Management System (McCornac, 2006; Turk, 2006; Tricker, 2008). This quality management system can have an impact on increasing the demands of customers in the global market (Farooqui and Ahmed, 2009)

because of an excellent evolution of a process and business performed by ISO 9001 certified companies (Lordsleem *et al*., 2010). However, a proper and full implementation of the ISO 9001 standard is a must to successfully achieve the benefit of applying the quality system.

For the past decade, the Indonesian construction sector has had the intention or has been made to promote the development and implementation of quality management systems (QMSs) amongst its various players. There are government regulations recommending registered construction service providers establish their own quality standards and determine their responsibilities to the public as well as to service local and global market needs. SNI 19-9001:2001 (ISO 9001–2000) for establishment, implementation and operation of a bona-fide QMS is recommended by the Ministry of Settlement and Regional Infrastructure and the Head of Construction of the Investment Development Board, as the quality standard to be implemented by all grades of Indonesian constructors. However, holding a valid ISO 9001 certification is compulsory for the large size construction companies that wish to be registered as the G-7, the highest grade of Indonesian contractor qualification. At present, the G-6 and G-7 contractors are the two qualifications categorized under the large size Indonesian construction companies, and in particular, the G-7 contractors are allowed to tender for government projects above USD 100,000 up to mega projects of much higher value.

Given the above, this paper aims to describe the research carried out through the data collection from a total of 77 (seventy-seven) construction firms with the certification standards ISO 9001-2000 and 2008 versions, in the three provinces in Indonesia, involving 403 respondents representing high-middle-low level in the organisational structure. The questionnaire survey was particularly addressed to investigating the level of implementation of twenty ISO 9001 elements in the G-7 construction company.

In the following sections, the concept of effectiveness of the implementation of ISO 9001 Quality management System is reviewed. Then steps of the research method are presented to illustrate the different process of undertaking data collection and analysis. After that, discussion is made on the basis of data analysis results and the findings. At the end, concluding remarks are presented as recommendations for the construction companies, and to inform the ongoing research related to this study.

2. The Effectiveness of Implementing ISO 9001 Quality Management System

Effectiveness has been defined by the British Standards Institution (BSI) as the extent to which planned activities are realized and planned results are achieved (British Standard Institution, 2009). This term ‘effectiveness’ is related to quality management system (QMS) implementation, since companies that adopt such a QMS based on ISO 9001 standard must meet their specified quality requirements and prescribed quality objectives without shortfalls in order for them to successfully implement their QMSs.

A successful implementation of a QMS as espoused in the relevant ISO 9001 standard, requires effective planning, operation, review and continuous improvement of the system at all levels of an organisation. By this means, management and staff must ensure that an effective QMS is established, implemented and maintained to achieve their quality objectives (Turk, 2006). Based on the improvements that can arise from effectively operating a robust QMS, a company will rapidly observe successful and continuous quality process improvements and these can further lead the company to the achievement of a more holistic and systematic approach to quality management, ultimately allowing the adoption of a Total Quality Management (TQM) philosophy.

Al-Nakeeb *et al*. (1998) state that the ‘effectiveness’ definition from BSI appears to mislead people into solely thinking that it implies the effectiveness in meeting the specified requirements and the prescribed quality objective. In fact, it refers to the effectiveness of the system in meeting and complying with the specified requirements of the standard. This means that effectiveness should really mean the meeting of a

company's own specified quality requirements and prescribed quality objectives in referring to the eight quality management principles and the twenty elements of ISO 9001 standard. For the specified quality requirements and prescribed quality objectives to be effectively implemented and hence conform to the quality standards, it must be ensured that a full implementation of the quality standards is made. In other words, all organisational members and task forces understand the essence of the requirements and apply them without doubt into the entire business process of the organisation.

Effectively implementing a quality management system (QMS) and espousing quality values or adopting a high-level quality philosophy, whether it is by virtue of operating an ISO 9001 QMS or applying a TQM approach, potentially provides benefits that are needed by any construction company. Low and Wee (2001) claim that by employing an ISO 9001-certified QMS, work repetition, project delays and failure to meet specifications can be minimized. Other advantages are that the buildability factor of most projects can be increased while the project cost is decreased because of the use of an appropriate framework for controlling the processes required when constructing the project. In support of the above view, Ofori *et al.*, (2002) point out that lessons learned from implementing a QMS ensure that a construction company can be more efficient in subsequent projects. More efficient in using material resources and more efficient in developing better internal communications and productivity in its standard operating procedures. The primary benefit of operating an effective, appropriate and transparent quality system is that a construction firm will be admired and chosen to bid in both local and global market contracts (ibid, 2002; Turk, 2006). Zin *et al.*, (2009) observe that the majority of Malaysian constructors have been able to improve their company competitiveness by 80% after having certified to ISO 9001. All this evidence leads to a conclusion that QMSs need to be developed and implemented effectively in any construction company wishing to be a sector leader.

3. Research Methods

The survey method using questionnaire was adopted for the present study. The survey method is suitable when a large amount of data needs to be collected from people with regard to their views and experiences of a particular phenomenon, and time available to collect the data is limited (Naoum, 2008; Fink, 2009). According to Fellows and Liu (2008, 23), "surveys operate on the basis of statistical sampling; only extremely rarely are full population surveys possible, practical or desirable. The principles of statistical sampling - to secure a representative sample – are employed for economy and speed". In addition, Fink (2009) alludes to the fact that even though this research method is familiar to the proposed respondents in this study, it needs the researcher's extra efforts to continually check progress and push completion.

3.1 Questionnaire Design

The questionnaire was designed to solicit respondents' opinions, based on their own experience, regarding the level of implementation of ISO 9001 QMS elements in their companies. The list of the twenty ISO 9001 elements were back-translated twice from the original English version into a Bahasa version by different translators who were fluent in both English and Bahasa. This approach was aimed to secure the most enthusiastic response possible to this survey.

A four-point itemized rating scale was provided for each questionnaire item and the respondent was asked to tick the relevant number against each item. The unbalanced rating scale consisted of 4=fully implemented, 3=not so fully implemented, 2=minimally implemented, 1=yet to be implemented. This measurement scale can be treated as interval data (Sekaran, 2009). The scale of the questionnaire did not include the mid-point due to the consideration of potential cultural bias in response to the survey instrument. According to Coffey (2010), some researchers' experiences and findings (Si and Cullen, 1998; Hofstede and Bond, 1988; Hofstede, 1991) of conducting research in Asian countries have strongly opined that managers tend to select the mid-point of an odd-number based Likert rating scale in a

questionnaire. They can even apply it in their general life; this reflects a Confucian doctrine that regardless of correctness, always follow a middle way. According to Beck (2010), confucius taught the middle way between extremes in regard to most virtues and considered moderation transcendent and rare in his time. Many researchers have different views of the use of the 'middle-way' response, however, it depends ultimately on the researcher's own decision and level of confidence in not using mid-point scales in questionnaire response categories (Coffey, 2010).

3.2 Selection of Respondents

The sample population for the questionnaire was drawn from ISO 9001 certified construction companies in the three capital provinces, i.e., Manado, Makassar, and Jakarta. The companies chosen mainly engage in the construction of building and/or civil engineering works including roads and bridges, construction of highways, and irrigation. The main reason for drawing respondents from these ISO 9001 certified construction companies and developers in these three cities is that they represent the environment of the construction industry of typical small, medium, and large cities in Indonesia.

The method used to determine the sample population combines random and non-random categories of data. Stratified random sampling is a method employed to randomly choose a number of samples representing each stratum of a population (Fink, 2009). This method is used to select respondents representing a typical construction company, i.e., Quality Management Representative (QMR), Managers (MR) and Project/Site Engineers (SE). These respondents also represent the high level (QMR), middle level (MR), and low level (PE) in the organisational structure. This study also uses a non-random sampling strategy, especially for purposive sampling method. This strategy is applied purposively to choose a QMR, who is considered as meeting the criteria for the survey, to provide opinions of the current QMS practices in their companies (he or she is a quality management specialist, who leads the development of a company's quality management system and ensures the quality system complying with the ISO 9001 standards).

3.3 Data Collection

The questionnaire survey was conducted from early September to the end of November 2010. With assistance of the National Construction Services Development Board and Indonesian Contractors Association specifically for obtaining the list of the grade-7 contractors in the three cities, the 900 questionnaire booklets were delivered to 118 companies. After the questionnaires were delivered, the researcher regularly conducted monitoring of the progress of the questionnaires and reminding the respondents of the timeframe for questionnaire completion. In total, 403 (44.8%) respondents from 77 (65.3%) companies participated in administering the questionnaires, consisting of 67 Quality Manager Representatives, 215 Managers (e.g., Project Manager, Purchasing Manager, Logistic Manager, Maintenance Manager, Finance Manager), and 121 Project and Site Engineers. One of the important lessons learned from the survey is that building a good approach and excellent communication with the targeted respondents, construction company associations and the related institutes are critical points for the success of good data collection.

4. Research Findings and Discussions

Before proceeding to detail data analysis, the reliability of the data was tested. This can be tested through Cronbach's alpha, to indicate the consistency of the questionnaire and whether the items measuring a concept hang together as a set (Sekaran and Bougie, 2009). The results of Cronbach's alpha was .923 (N=20), which indicated the reliability of the construct questionnaire was acceptable for further analysis. The closer the reliability coefficient is to 1.0, the better it is, meaning the higher the internal consistency reliability (ibid, 2009).

An analysis using Pearson's correlation coefficient indicated that there was a positive significant linear relationship between all pairs of questions, with the majority of the *r* value ranged from .3 to .5, $p < .001$. It was hypothesised that a positive relationship would exist between all pairs of the twenty variables. Results of the correlation indicated that, for example, management responsibility was significantly correlated with quality system, $r = .533$, and document and data control, $r = .377$; the document and data control was also correlated with quality system, $r = .374$ (all *ps* < .001). Table 1 shows the Pearson's correlation results for the twenty variables; suppression of the variable labels was carried out for reasons of space. The *r* results also confirm the entire questionnaire statements are reliable and meeting a construct validity for the purpose of this study.

Table 1: Pearson's Correlation Results for Quality Management System 9001-Elements

	1	2	3	4	5	16	17	18	19	20
Element 1	1	.533**	.364**	.285**	.377**	.320**	.360**	.413**	.315**	.279**
Element 2	.533**	1	.450**	.302**	.374**	.454**	.503**	.438**	.479**	.358**
Element 3	.364**	.450**	1	.394**	.449**	.430**	.467**	.372**	.325**	.254**
Element 4	.285**	.302**	.394**	1	.538**	.410**	.329**	.398**	.306**	.262**
Element 5	.377**	.374**	.449**	.538**	1	.457**	.451**	.357**	.338**	.263**
Element 6	.417**	.454**	.416**	.356**	.473**	.510**	.475**	.321**	.422**	.186**
Element 7	.268**	.266**	.269**	.313**	.272**	.277**	.332**	.387**	.372**	.154**
Element 8	.200**	.324**	.381**	.353**	.417**	.463**	.408**	.285**	.416**	.263**
Element 9	.357**	.399**	.353**	.309**	.375**	.461**	.420**	.350**	.393**	.278**
Element 10	.443**	.534**	.408**	.393**	.345**	.447**	.474**	.474**	.402**	.314**
Element 11	.274**	.373**	.289**	.312**	.315**	.386**	.411**	.364**	.268**	.268**
Element 12	.208**	.395**	.354**	.364**	.342**	.391**	.501**	.318**	.332**	.279**
Element 13	.252**	.354**	.302**	.345**	.309**	.426**	.373**	.349**	.456**	.269**
Element 14	.289**	.401**	.349**	.362**	.370**	.472**	.404**	.264**	.373**	.283**
Element 15	.330**	.410**	.463**	.400**	.431**	.567**	.442**	.325**	.376**	.260**
Element 16	.320**	.454**	.430**	.410**	.457**	1	.593**	.436**	.514**	.347**
Element 17	.360**	.503**	.467**	.329**	.451**	.593**	1	.523**	.554**	.393**
Element 18	.413**	.438**	.372**	.398**	.357**	.436**	.523**	1	.569**	.343**
Element 19	.315**	.479**	.325**	.306**	.338**	.514**	.554**	.569**	1	.394**
Element 20	.279**	.358**	.254**	.262**	.263**	.347**	.393**	.343**	.394**	1

Notes:
**Correlation is significant at the 0.01 level (2-tailed).

The average of a distribution (the arithmetic mean) results in Table 2 show that eighteen variables have *mean* spreading from 3.00 to 3.50. These values suggest the construction companies do not fully implement the eighteen ISO 9001 elements. The other two variables' *mean*, namely control of customer-supplied product (2.84) and statistical techniques (2.38) which are less than 3.00, suggest these two ISO 9001 elements were only minimally implemented by the construction companies. None of the ISO 9001 elements was fully implemented by the construction companies.

Table 2: Ranking Hierarchy of ISO 9001 QMS Elements Implementation (*N* = 403)

No	Area	Variables of the Twenty QMS 9001 Elements	*Mean*	*S.D.*	Mean Rank
1.	Control of a nonconforming product	Materials or products that fail to meet specifications are rejected and separated from normal production. Only the proper authorities may decide if rejected material will be used as is, reworked or returned to the supplier.	3.47	.688	1
2.	Process control	Work instructions, quality plans and workmanship standards verify that each job is being done correctly.	3.43	.655	2
3.	Contract review	Contracts reflect customers' need and expectations.	3.40	.682	3
4.	Control of quality records	Quality records provide an audit trail for internal and external	3.40	.703	3

		auditors.			
5.	Control of inspection measuring and test equipment	Instruments and measuring tools are calibrated regularly, and records maintained.	3.37	.766	4
6.	Inspection and testing	Inspection and testing at receiving, in-process and final inspection areas ensure quality compliance. Test and inspection records are retained and preserved as part of the quality documentation system.	3.36	.682	5
7.	Corrective and preventive action	The corrective action system focuses on identifying the root causes of quality concerns and any corrective and preventative actions required.	3.35	.683	6
8.	Internal quality audits	Trained teams verify that the company Quality System is working by evaluating that the ISO 9001 requirements examined by the external auditors are being met on an on-going basis.	3.35	7.49	6
9.	Inspection and test status	Only inspected materials may be used or processed further. Inspected product is always identified.	3.34	.714	7
10.	Handling, storage, packaging, preservation and delivery	Procedures outline practices that protect products from damage during construction and delivery.	3.34	.709	7
11.	Purchasing	Purchasing procedures fully describe supplier requirements and there is a formal system for ensuring compliance to these standards.	3.32	.689	8
12.	Design control	Design changes are carefully documented to ensure that they become fully coordinated and are approved internally and by clients.	3.27	.692	9
13.	Document and data control	Creation and modification of any quality documentation is strictly controlled by established procedures.	3.25	.752	10
14.	Product identification and traceability	Methods of tracking the dates and lot-codes of products and raw materials from arrival on site to incorporation into construction guarantee traceability.	3.20	.735	11
15.	Servicing	Where servicing is specified in the contract, procedures are established to verify that servicing meets the indicated requirements.	3.19	.790	12
16.	Quality system	A Quality Manual and supporting procedures have been created and are maintained.	3.10	.647	13
17.	Training	Training records are maintained for every employee showing their levels of expertise and frequency of training.	3.09	.811	14
18.	Management responsibility	Management sets the company quality policy and implements it by providing resources and training.	3.03	.758	15
19.	Control of customer-supplied product	Procedures detail methods of handling and safekeeping of product supplied by clients.	2.84	.817	16
20.	Statistical techniques	Control charts, graphs and other methods of analysis determine how well a process is working and facilitate continuous improvement.	2.38	.728	17

Notes:
Less than 3.00 = minimally implemented, 3.00-3.50 = not so fully implemented, 3.51-4.00 = fully implemented.

Table 2 addresses the objective of the research study which is to evaluate the current implementation levels of the ISO 9001 elements. The data relating to table 2 supports the preliminary study in that there has been a doubt cast on the whole concept of quality management and quality management system implementation. This leads to failure in executing proper ISO 9001 interpretation and an ineffective and inefficient implementation stage. Thus the expected benefits of QMS implementation will be difficult to achieve by the ISO 9001 certified construction companies. Based on the *mean* ranking, 'control activities' are considered important by the contractors, as these are traditionally the important milestones in undertaking construction projects. The control activities include control of a nonconforming material or product, control of work processes, control of documents, and control of inspection measuring and testing equipment. Similarly, inspection and testing, internal quality audits followed by corrective and preventive action are perceived by the contractors as essential areas to improving the way they operate their quality management systems.

This simple statistical model, the mean, shows the other areas of the ISO 9001 elements that are minimally implemented by the construction companies. It covers quality system, training, and management responsibility. The issues relating to these three areas are common but also drawbacks that revolve around performing an effective quality management system. Nevertheless, top management needs to be convinced of the underlying concepts of ISO 9001 and its benefits if properly implemented and operated (Willar *et al*., 2010). The quality management team should have the skills to assist the quality manager in ensuring that the operation of a company's QMS complies with all of the ISO 9001 requirements. Technical employees and site operatives also need concentrated training on how to properly carry out specified works on construction projects to a high standard. In researching construction worker training programs in Iran, Tabassi and Abu Bakar (2009) it was discovered that short term training courses at fixed centers (off-the-job training), trainers being sent out to the construction sites (on-the-job training), and self-learning together with taking part in standard exams, are some useful methods that can be used to educate construction workers. This may then lead them to applying better controls and procedures and thus help to prevent the delivery of low quality construction works (ibid, 2009). These example cases are proposed to suggest to the contractors the significance of these elements in supporting the successful adoption and application of ISO 9001 QMS.

Finally, the survey findings indicate that there are two elements of the ISO 9001 QMS that appear difficult to be implemented by the G-7 contractors. They are:

- Procedures detail methods of handling and safekeeping of product supplied by clients;
- Control charts, graphs and other methods of analysis determine how well a process is working and facilitate continuous improvement.

A survey in the UK ISO 9001 companies stated that 46 % of respondents would not use statistical tools and other quality techniques, and 54% would use even if not required to by ISO 9001 (Coleman and Douglas, 2003). The lack of using some form of statistical control was admitted to the author (based on the experiences as Quality Management Representative) due to less awareness of the usefulness of the statistical model and the fact that they have fewer human resources who are interested in and capable of conducting any statistical analysis. Awareness of the implementation of tools and techniques for QMS improvement together with the statistical training might be needed, as well as encouraging communication with clients to have consensus in preparing and developing procedures regarding conformance of product safety as required by clients.

5. Concluding Remarks

The extent of the implementation of the twenty elements of ISO 9001 Quality Management System (QMS) based by the G-7 Indonesian construction companies, which is as a barometer of the effective QMS practices, shows two types of levels of implementation. Amongst the twenty elements, 18 areas are 'not so fully implemented' whilst two areas are only minimally implemented, namely control of customer-supplied product and statistical techniques. Based on these analyses, standard operating procedures which describe detailed methods of the handling and safekeeping of product supplied by clients can be suggested to be developed and implemented by the construction companies. These analyses can also help management and decision-makers to fully employ statistical tools, such as control charts, graphs and other methods of analysis in conducting measurement and analysis for the continual improvement of the systems. Whilst this study deals with the current status of QMS implementation in Indonesian construction companies, the ongoing study is assessing the construction companies' performance, in referring to several key performance indicators, particularly during implementing such as ISO 9001 QMS based.

6. References

Ahmed, S.M., Aoieong, R.T., Tang, S.L., and Zheng, D.X.M. (2005). "A comparison of quality management systems in the construction industries of Hong Kong and the USA". *International Journal of Quality & Reliability Management*, Vol. 22, No. 2, pp. 149-161.

Al-Nakeeb, A., Williams, T., Hibberd, P., and Gronow, S. (1998). "Measuring the effectiveness of quality assurance systems in the construction industry". *Property Management*, Vol. 16, No. 4, pp. 222-228.

Beck, S. (2010). Confucius, Mencius and Xun-zi. Online at http://www.san.beck.org. Accessed on May 30, 2010.

British Standard Institution. (2009). ISO 9000:2000 Quality management systems - fundamentals and vocabulary. Online at http://www.bsigroup.com. Accessed on March 29, 2010.

Cachadinha, N.M. (2009). "Implementing quality management systems in small and medium construction companies: A contribution to a road map for success". *Leadership and Management in Engineering*, Vol. 9, No. 1, pp. 32-39.

Coffey, V. (2010). *Understanding Organisational Culture in the Construction Industry*. Spon Press, London.

Coleman, S., and Douglas, A. (2003). "Where next for ISO 9000 companies?". *The TQM Magazine*, Vol. 15, No. 2, pp. 88-92.

Elghamrawy, T., and Shibayama, T. (2008). "Total quality management implementation in the Egyptian construction industry". *Journal Of Management In Engineering*, Vol. 24, No. 3, pp. 156-161.

Farooqui, R.U., and Ahmed, S.M. (2009). "A stepping stone to total quality management for construction companies", In *7th Latin American and Caribbean Conference for Engineering and Technology*, San Cristobal,Venezuela.

Fellows, R., and Liu, A. (2008). *Research Methods for Construction*, 3rd edition, Wiley-Blackwell, Oxford.

Fink, A. (2009). *How to Conduct Surveys: A Step-by-step Guide*, 4th edition, SAGE Publications, Thousand Oaks.

Hofstede, G.H. (1991). *Cultures and Organizations Software of the Mind*, Mc-Graw-Hill, London.

Hofstede, G., and Bond, M.H. (1988). "The Confucius connection: from cultural roots to economic growth". *Organizational Dynamics*, Vol. 16, No. 4, pp. 5-21.

Lordsleem, A.J., Duarte, C., Barkokebas, B.J. (2010). "Performance indicators of the companies quality management systems with ISO 9001 certification", In *CIB 2010 World Congress*, Editors: P. Barrett, D. Amaratunga, R. Haigh, and K. Keraminiyage, Salford Quays, United Kingdom.

Low, S.P., and Wee, D. (2001). "Improving maintenance and reducing building defects through ISO 9000". *Journal of Quality in Maintenance Engineering*, Vol. 7, No. 1, pp. 6-24.

McCornac, D.C. (2006). "The implementation of ISO9000 in Vietnam: Case studies from the footwear industry". *International Business & Economics Research Journal*, Vol. 5, No. 2, pp. 77-86.

Naoum, S.G. (2008). *Dissertation Research & Writing for Construction Students*, 2nd edition, Butterworth-Heinemann, Oxford.

Ofori, G., Gang, G., and Briffet, C. (2002). "Implementing environmental management systems in construction: lessons from quality systems". *Building and Environment*, Vol. 37, No. 12, pp. 1397-1407.

Sekaran, U., and Bougie, R. (2009). *Research Methods for Business: A Skill Building Approach*, 5th edition, John Wiley & Sons Ltd., United Kingdom.

Si, S.X., and Cullen, J.B. (1998). "Response categories and potential cultural bias: effects of an explicit middle point in cross-cultural surveys". *International Journal of Organizational Analysis*, Vol. 6. No. 3, pp. 218-230.

Tabassi, A.A., and Abu Bakar, A.H. (2009). "Training, motivation, and performance: The case of human resource management in construction projects in Mashhad, Iran". *International Journal of Project Management*, Vol. 27, No. 5, pp. 471-480.

Tricker, R. (2008). *ISO 9001:2000 for Small Business*, 3rd edition, Butterworth-Heinemann, Oxford.

Turk, A.M. (2006). "ISO 9000 in construction: An examination of its application in Turkey". *Building and Environment*, Vol. 41, No. 4, pp. 501-511.

Willar, D., Coffey, V., and Trigunarsyah, B. (2010). "An examination of factors influencing effective and continuous improvement of Indonesian contractors' quality management system", In *8th International Conference on Construction and Real Estate Management*, Queensland University of Technology, Brisbane, Australia.

Zin, R., Chen, G., and Ali, M. (2009). "An Observation of Impact in Implementation of Quality Management System by Contractors". *Malaysian Construction Research Journal*, Vol. 4, No. 1.